

Comment on essd-2021-467

Anonymous Referee #3

Referee comment on "The Landscape Fire Scars Database: mapping historical burned area and fire severity in Chile" by Alejandro Miranda et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-467-RC3>, 2022

[General comments]

The objective of this article is to present and make available the "Landscape Fire Scars Database", a collection of historical fires in Chile built from officially reported fires and Landsat data. Availability of this data is an asset for researchers of various fields and to the fire-science community in particular. The latter will be glad to employ this source for the training or validation of BA regional or global products. The effort to create and make this database available it is a good example of a multi-institutional endeavour that countries developed to different degrees could focused on.

[Specific comments]

Below I noted some points which could be addressed to improve the article (some of them are described more in detail later in the line-by-line comment section):

- 1) It is recommended a deeper review of the CONAF existing fire/BA data be added: a section detailing the BA data CONAF products before the creation of this database, so the contribution of the new database is better understood. This would help in the comparison of the number of fires reconstructed (Table 2) that suggests there is a more accurate source available. Also, it would be beneficial to add detailed information about the source of the point database employed to reconstruct the fires.
- 2) The methodology employed to map burned areas is not totally clear; even though the code is available for GEE users, a nice feature that ensures reproducibility. Firstly, it is not clear when 'mosaic' or 'median' reducers are employed to reduce imagecollections to images. If the 'median' were employed, this would reduce the noise but would soften the

burned signal as well, an important feature for severity mapping. Secondly, the way an analyst define the threshold to map the burned area is not clearly defined - I guessed this is an interactive process based on visual assessment, however it is not clearly detailed. In addition, when describing the mapping process in GEE, it is convenient to address the difficulties encountered before writing them in the discussion section (for example, when there are neighbouring fire events, or when omission or commission errors are found in the mapping exercise). Finally, a statistical analysis of the RdNBR thresholds employed in different years/regions would be interesting, although maybe it is beyond the scope of this paper.

3) Authors define a 10 ha limit for reconstructing the fire perimeters. This is a very big area, in excess of 100 Landsat pixels, and it would be convenient to discuss and justify this choice carefully.

4) In the validation process, a database of 194 fire scar perimeters has been employed as a comparison source (2015-2018 years), only 78 of them reconstructed. Omitting 60% of the fire scars gives the impression that many fires are not reconstructed for various reasons (and theoretically not because of a lack of images in those years). In addition, Table 2 shows that 66.6% of fires are reconstructed (hence, omission of 33%). The above should be clearly addressed and discussed, as it is an important limitation of the database.

5) It seems the accuracy of the assessment is not clearly established. When considering the 78 fires perimeters, I was expecting to see validation metrics comparing those perimeters database/ manually derived. I found only one paragraph (section 3.1) on the accuracy of the perimeters, plus the metrics shown are not clear ("global accuracy result is 0.79"). Section 2.3 refers to the methodology followed to carry out an accuracy assessment with the Closeness Index, however no results derived from this methodology for the 78 patches are shown, only some illustrative results in Figure 4. For completeness, I would also add error matrix derived metrics (user/producer accuracy or complementary omission/commission errors) in order to have similar metrics comparable to other research studies. Also convenient, I would add comparative information between your approach and coarse/resolution BA products (MCD64A1, FIRECCI products, GABAM; or the global wildfire dataset (<https://doi.org/10.6084/m9.figshare.10284101>) This would give an idea of the accuracy of the database to potential users.

6) The lack of availability of Landsat imagery is one of the sources of omission of the database. It would be interesting to follow up doing an imagery availability analysis across Chile through the years. Linked to this, the regional availability depending on the cloud cover mentioned in the text could be better contextualized.

About the data publicly available:

- 1) It was straight forward to download the database - I download it without any problem.
- 2) It is reassuring the quality control described in the manuscript warrants file-concordance between fires.
- 3) It would be helpful to upload the information within this database to the GEE servers so that users may be able to use and assess it directly (for example an asset with the

perimeters and severity). I would emphasise in the manuscript the reason why this database is important. For example, to me, it is not clear why post- and pre-imagery is added, and why the NBR/ RdNBR is included (I can only guess most of the people will use the perimeters/Severity associated from the process).

[Line by line comments]

Line 56 -> I would add an additional reference to the fire_cci BA products (MERIS/ AVHRR / MODIS /OLCI based),

<https://doi.org/10.1016/j.rse.2015.03.011> /

<https://doi.org/10.1016/j.jag.2021.102473>

<https://doi.org/10.1016/j.rse.2019.111493>

<https://doi.org/10.5194/essd-10-2015-2018>

<https://www.mdpi.com/2072-4292/13/21/4295>

<https://doi.org/10.3390/rs13214295>

Line 60 (or 69)-> I would include a link to the GABAM database (Landsat, 30m) (although it is later referenced)

<https://vapd.gitlab.io/post/gabam/>

<https://doi.org/10.3390/rs11050489>

Line 97 -> It would be a good addition to upload the database to GEE and share the assets.

Line 106 -> Figure 1 does not correspond to the study site but to the methodological workflow

Line 112 -> the link does not point to a web page with burned area statistics but to a general web page to the CONAF

Line 119-> I'm not a GEE expert but I believe GEE native language is not Javascript (it is the most popular client library because of the code editor

<https://code.earthengine.google.com/>)

Line 120 -> Incorrect reference: it refers to Figure 1 and not Figure 2

Line 133 -> " We use the atmospherically corrected surface reflectance and orthorectified images from Landsat 5 (1984-2013), 7 (1999-) and 8 (2013-)" The collection and GEE tag could be indicated

Line 140 -> 'Pixels of snow, clouds, and cloud shadows are excluded from each image on the basis of the pixel quality band provided by Landsat.' I think these methodological details should be covered more in detail.

Line 141 -> "For each image collection, we applied either the mosaic or the median reducer function to get a unique image of the landscape conditions at moments as close as possible before and after a fire event." This affirmation must be clarified. How do you get the closest burning date with the median reducer? In principle, employing the median reducer would decrease the burned signal strength

Line 151 -> "This index has shown better results in Mediterranean areas" Does this sentence refer to mapping burned areas or to burning severity?

Line 187: "the event's severity is calculated from the RdNBR in a continuous raster format and categorized based on the ranges proposed by Miller and Thode (2007)." I think it would help writing down the ranges proposed in the manuscript

Table 1: RdNBR is not fully described (square root of what in the divider?)

Line 169 -> "Step (iv) involved the selection of the RdNBR index value for each wildfire that best captures the burned area based on visual interpretation. ". Please reword and clarify what this sentence mean.

Line 202: Please complete the Brull reference "Brull, J.: Análisis de la severidad de los incendios de magnitud de la temporada de incendios forestales 2017-2018, 2018."

Line 206: What was the spatial distribution of the evaluation samples? If the minimum size was 200 ha and 60% were not mapped by the database (78/194), the omission of the database seems high. It would be important to calculate the omission percentage both in number and area percentage.

Line 210: Why not use error matrix based traditional metrics like User/producer accuracy (or the complementary Omission, commission errors)? I understand the usefulness of the polygon-based comparison due to both source and validation being polygons but I believe having and omission/commission rate would be more significant.

Line 256: "Using the data for all 12,250 fires recorded by CONAF between 1985 and 2018 with a burned area greater than 10 ha,". How is this information collected in CONAF? A description of the methods employed would be helpful.

Table 2: "R is the number of reconstructed fire scars contained in our database, and UR is the number of fire scars in the database that could not be reconstructed due to the unavailability of satellite images." R and UR are not listed in the table. Are those the Yes/No columns? Please edit.

Line 260: A typical map of the number of Landsat scenes available across Chile would be interesting to understand changes through the years.

Line 270: "The total number of fires >0.01 ha exhibits a positive linear relationship with the total number of fires > 10 ha also recorded by CONAF between 1985 and 2018 ($R^2 = 0.86$)." I cannot establish between which two variables this relationship is performed. First, I think it would be helpful to clarify what is the CONAF dataset. Then, the slope and intercept of the regression would add valuable information about the tendency of over/under estimation.

Line 272: "indicating that the distribution of the reconstructed data is regionally representative (Table 2, Figure 2)" -> please add the scatterplots as the reader may expect them.

Line 290: Fire scar evaluation: Line 298: "Nevertheless, the global accuracy result is 0.79"

This is an important result but it is not easily understood: is it the aggregated 78 'Dnorm' value? Please specify.

Line 300: Some of the limitations addressed here are new for the reader, I think they should be noted before in the results/methodology sections. For example, issues like having more than one fire event in neighbouring areas should have been addressed in the methodology section. The same applies for problems related to commission errors.

Line 381: I would make clearer 5 days temporal resolution starts in 2017 with the second satellite, and that although some bands are at 10 m spatial resolution, critical bands accurate BA mapping like SWIR are at 20 m.

Line 390 "No evident pattern associated with the latitudinal or vegetation-type change was observed in applying the threshold value to identify scars". It would be interesting to analyse the validity of the threshold values throughout various regions/years in Chile.

Figure 2: Instead of using negative longitudes and latitudes, it is preferable to use South / West. For clarity, avoid adding the background shadows in the detailed maps.

Figure 3: I appreciate this is a plot to illustrate the computed variables, however I would include also information about the place/date of the fires illustrated.

Figure 4: I would define 'Dnorm' in the footnote for clarity